

- Engineering news.* New York. v. 67. 1912.  
— The origin and composition of icebergs. p. 1225. (June 27.)
- Engineering news.* New York. v. 68. 1912.  
— Wind pressure on inclined roofs. p. 66-68. (July 11.)  
— The relation between wind velocities and pressures. p. 75-76. (July 11.)
- Geographical journal.* London. v. 45. July, 1912.
- Turley, Robert T.** Climatic and economic conditions of northern Manchuria. p. 57-59.  
— Health of white men in the Philippines. p. 85. [Abstract of article in Philippine Journal of Science as to effects of tropical light. Negatives the opinion that brunettes are better adapted to the climate than blondes.]
- International institute of agriculture. Bureau of agricultural intelligence and of plant diseases. Bulletin.* Rome. 3d year. June, 1912.
- Talanoff, V.** Relation between rainfall and the maize crop in Russia. p. 1264-1266. [Abstract.]
- Eredia, Filippo.** Climatology of Tripoli and Benghazi (Climatologia di Tripoli e Bengasi). p. 1269-1271. [Abstract.]
- International institute of agriculture. Bureau of economic and social intelligence. Bulletin.* Rome. 3d year. May, 1912.  
— Work of the hail insurance companies and mutual hail insurance societies [of France] in the last twenty years. p. 47-52.
- Nature.* London. v. 89. 1912.
- Barnes, Howard T.** Icebergs and their location in navigation. p. 411-414. (June 20.) [Abstract.]  
— The drift ice of the great Newfoundland bank and its danger to navigation. p. 428. (June 27.)
- Popular science monthly.* New York. v. 81. July, 1912.
- Humphreys, W[illiam] J[jackson].** Holes in the air. p. 50-60.
- Scientific American.* New York. v. 106. June 29, 1912.  
— The "electric Niagara" delusion in France. A new supposed method of preventing hail. p. 584.
- Talman, Charles Fitzhugh.** New ideas about lightning. A postscript to the schoolbooks and encyclopedias. p. 586-587.
- Scientific American supplement.* New York. v. 73. 1912.
- Alter, J. Cecil.** Predicting water supply for the farmer. Forecasting summer flow of streams from snow measurements in the mountains. p. 413-414. (June 29.)
- Talman, Charles Fitzhugh.** The elusive will-o'-the-wisp. One of nature's unsolved enigmas. p. 47-48. (July 20.)
- Zahn, A. F.** Elements of theoretical aeromechanics. p. 30-31; 37-38; 51. (July 13-27.)
- Symons's meteorological magazine.* v. 47. 1912.  
— Abbott Lawrence Rotch. p. 92-93. (June.)  
— Meteorological instruction for aviators. p. 93-94. (June.) [Meteorological features of the British scheme of military and naval aviation.]
- Henkel, F. W.** The aurora. p. 122-125. (July.)
- Academie des sciences. Comptes rendus.* Paris. Tome 154. 10 juin 1912.
- Guye, Ph. A, Kovacs, G., & Wourtzel, L.** Poids du litre normal d'air atmosphérique à Genève. p. 1584-1586.
- Vallot, J[oseph].** La grêle et le givre au Mont Blanc. p. 1650-1652.
- Chauveau, A. B.** Observations sur l'électricité atmosphérique pendant l'éclipse du 17 avril 1912. p. 1652-1654.
- Broglie, — de.** Sur l'éclipse du soleil du 17 avril et la radiation pénétrante mesurée par l'ionisation naturelle de l'air en vase clos. p. 1654-1655.
- Archives des sciences physiques et naturelles.* Genève. Tome 33. 15 juin 1912.
- Trillat, A.** Sur la théorie miasmatique et les idées du jour. p. 500-523.
- Cosmos.* Paris. 61 année. 27 juin 1912.  
— Influence de l'aurore polaire sur les ondes électriques. p. 703-704.
- Nature.* Paris. 40 année. 18 juillet 1912.
- Loisel, J[ulien].** L'observation des nuages. p. 106-109. [Illustrated.]
- Observatoire royal de Belgique. Annuaire météorologique pour 1912. Bruxelles.*  
— Le crépuscule météorologique d'après J. Kiessling. p. 19-23.  
— La température à l'ombre et la température au soleil. p. 28-35.  
— Les feux follets. p. 37-66.  
— Observations de mistpoeffers. p. 67-79.  
— Liste des meilleurs ouvrages de météorologie. p. 80-88.
- Vanderlinde, E.** Les orages en Belgique en 1911. p. 89-128.
- Vanderlinde, E.** Revue climatologique pour l'année 1911. p. 129-162.  
— Le réseau climatologique. p. 163-176.
- Vanderlinde, E.** La grêle en Belgique pendant l'année 1911. p. 177-203.
- Obrervatoire royal de Belgique. Annuaire météorologique pour 1912. Bruxelles*—Continued.
- Vincent, E.** Ascensions de ballons-sondes en Belgique. p. 204-237.  
— Notes bibliographiques sur les nuages (Classification et nomenclature). p. 262-271. [Calls attention to numerous faults and errors in the International Cloud Atlas.]
- Beiträge zur Geophysik.* Leipzig. 11. Band. 2/4. Heft. 1912.
- Wagner, Gottbold.** Die Änderung des Luftdruckes im anomalistischen Monat. p. 276-313.
- Wolff, Hans.** Beiträge zur Extinktion des Fixsternlichts in der Erdatmosphäre. p. 354-413.
- Förster, Gustav.** Beitrag zur Theorie der Seitenrefraktion. p. 414-469.
- Wegeher, Alfred.** Die Erforschung der obersten Atmosphärenschichten. p. kl. Mitt. 104-124.
- Wegeher, Kurt.** Das Aufsteigen der Luft über tätigen Vulkanen. p. kl. Mitt. 136-139.
- Sernander, Rutger.** Postglaziale Klimaschwankungen im skandinavischen Norden. p. kl. Mitt. 140-147.
- Meteorologische Zeitschrift.* Braunschweig. Band 29. Juni 1912.
- Johansson, Oscar V.** Über Wasserstands- und Klimaschwankungen in Nordeuropa nach Wallén u. a. p. 257-262.
- Defant, A.** Der tägliche Gang der Temperatur auf dem Obirgipfel (Hannwarte 2141 m.) p. 263-272.
- Kabos, Hegyofky.** Ein Beitrag zu den Wärmesummen in der Phänologie. p. 272-281.
- Richarz, F.** Über die das Brockengespenst umgebenden Beugungsringe. p. 282-285.
- Obermayer, Albert v.** Photographie der Glorie um den Ballon-schatten vom Ballon aus. p. 286-287.
- Peppler, Albert v.** Der vertikale Gang der Temperatur und Windgeschwindigkeit im tropischen und subtropischen Atlantischen Ozean. p. 288-290.
- Ficker, Heinrich v.** Beobachtung vertikaler Luftbewegung bei Ballonfahrten im Gebirge. p. 292-294.
- Diercke, H.** Über die Helligkeit des Himmels in der Nähe der Sonne. p. 294-296. [Abstract.]
- Corrigendum—*Monthly Weather Review.* v. 40, No. 4. p. 649, column 1, line 9. For "Advance of Agriculture. What science is doing for the farmer," read: "Mixing air to prevent frosts." p. 11. (May 18.)

#### MAMMATO-CUMULUS CLOUDS.

By W. J. HUMPHREYS, Professor of Meteorological Physics, U. S. Weather Bureau.

The accompanying illustrations, from photographs taken at Bartlesville, Okla., June 15, 1912, at 6.30 p. m., by Mr. Loran C. Twyford, show an admirable example of that unusual cloud formation commonly known as the mammato-cumulus.

Mr. Twyford writes that possibly 45 minutes before the clouds were seen a cyclone did great damage about 20 miles away, and in the direction from which the clouds came. Similar clouds were observed by Prof. H. C. Frankenfield<sup>1</sup> at St. Louis in connection with and just preceding the tornado of May 27, 1896, that did such damage in that city. They have also been noted occasionally by many other observers and in various parts of the world but usually in the neighborhood of tornadoes, squalls, or other violent atmospheric disturbances.

Osthoff<sup>2</sup> in his report on 67 occurrences of the mammato-cumulus which he observed during the course of 21 years, 1885-1905, says that they are tenfold more frequent during summer than in winter, and nearly as many fold more frequent of afternoons than of mornings. He also finds that this particular formation occurs at various levels and especially as a modification of the strato-cumulus and other sheet clouds.

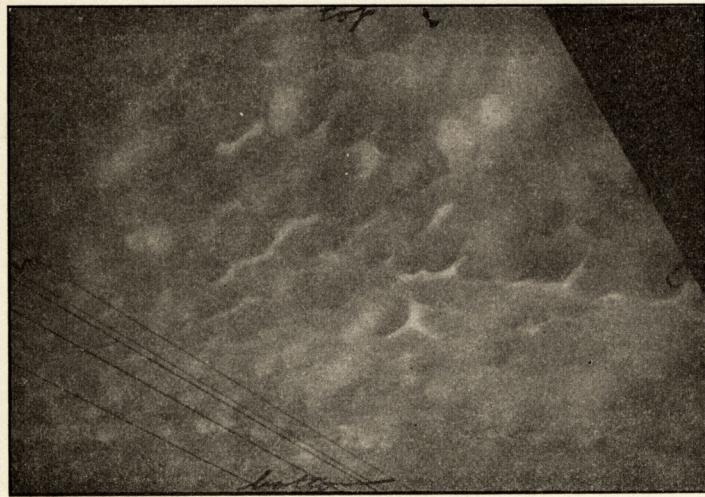
Presumably, then, the formation of mammato-cumuli is dependent upon certain unusual conditions incident to hot weather and that are often productive of severe local storms. Just exactly how they are formed, however, is not certain, but apparently they are due to local down

<sup>1</sup> Monthly Weather Review, vol. 24, p. 77, 1896.  
<sup>2</sup> Met. Zeit., vol. 23, p. 401, 1906.

rushes, or cataracts, of cold air, the general process conceivably being as follows:

1. A violent up rush, under cyclonic conditions, of the lower atmosphere, and consequent projection, by virtue of acquired momentum, to elevations beyond the equilibrium level, where it is dynamically cooled to temperatures below that of the surrounding air.

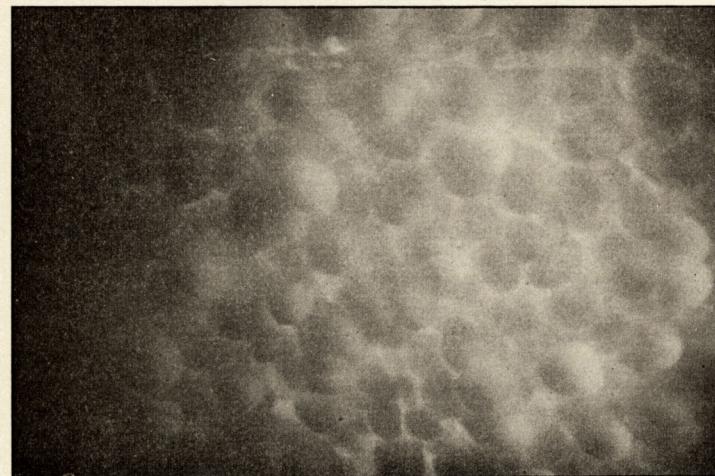
2. A rapid horizontal spreading, under the influence of the cyclonic whirl, of the overlying cooled atmosphere



at a considerable elevation, and therefore often above a stratus cloud of some type.

3. A descent in numerous places of the abnormally cold and consequently unstable air upon and through the underlying cloud stratum; thereby in each such place forcing the cloud below its wonted level and at the same time, through counter convection, raising its intermediate portions above their former position, and thus accentuating the whole phenomenon of pendulous formation.

The actual process, whether in general as above suggested, or some other not so obvious, seems to require



an existing cloud to render it visible, and to be such as to convert a stratus of whatever type into a group of festooned, pendulous, pocket or mammato-cumulus clouds, as run some of its numerous names.

Apparently this type of cloud has very rarely been photographed, and therefore it is earnestly hoped that Mr. Twyford and many others may secure additional records

for the further study of this interesting, unusual, and because of its frequent close relation to tornadoes, perhaps even ominous phenomenon.

#### UNUSUAL HAILSTONE FORMATION.

The following is extracted from a letter to the Weather Bureau from Mr. D. J. Lingle, Rapid City, Mich.:

Possibly the inclosed sketches (samples) of 3 hailstones that fell here June 15, 1912, may be of interest to you. They are natural size, and the peculiar structure will possibly explain their formation and throw light on hail-forming conditions. The stones were laid on paper and outlined as accurately as I could do it.

The drawings are reproduced herewith and are believed to represent very unusual formations.

